



A 20 METRE VERTICAL

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This antenna experiment started with a simple telephone call from Holland. Some of my old friends; PAOSQ and PA0CH asked could we make contact on twenty metres, by joining a group of VKs and PAs who were making contact on 14.100 MHz daily.

PRELIMINARY EXPERIMENTS

A dipole was constructed from aluminium tubing, tuned, matched and set in the correct direction. Despite the good conditions not a whisper came across.

Little effort and material was involved in modifying the dipole to a ground-plane. Tuning was achieved by adjusting the length; matching by bending down the radials. With this antenna we had some results. We received good reports but unfortunately, more often than not, we had to spell our name 'LEO' and QTH; 'MELBOURNE' three times to receive a 'Roger'. While this is sufficient to be awarded a QSL card an improvement is needed for a pleasant contact.

SOME HISTORY

An antenna, popular in the 1950's when most amateurs used open feeders, was the 'J' antenna or the vertical zepp (Fig. 1). The vertical radiation pattern from this antenna with the base one half wave length above ground shows only one main lobe at 15° above the horizon. Yet excellent DX can be expected with the base down to one quarter wave above ground.

We had good results at that time with one constructed from electrical conduit with a steel tank aerial on the top.

Who remembers those days? 'Snowy' Milbourn (Silent Key) must have sold hundreds of tank aeralis from his old Ham Radio shop at that time in Melville Street, Hawthorn.

CONTINUING THE EXPERIMENT

This time construction was from aluminium tubing in imperial sizes. This is an excellent telescopic fitting material. First attempt on receive only, using an antenna tuner, was a remarkable improvement to the ground plane. This was mainly because the local stations were way down due to the difference in polarization. A disadvantage was,

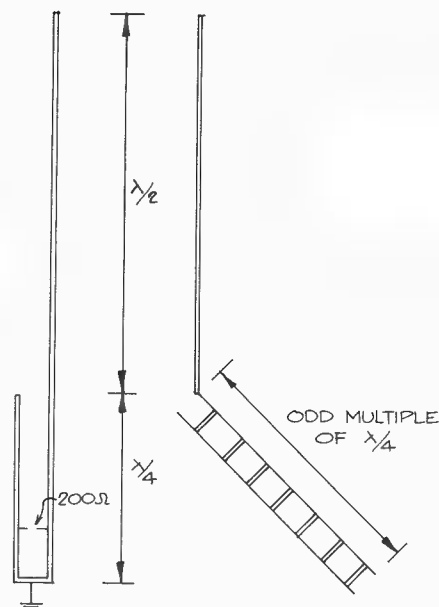


Fig 1: J Antenna. Vertical Zepp

we could not copy the local stations. This created problems in a round-table-local-DX-QSO.

Over the next few days, between daily contacts, the antenna was tuned and matched until the tuner could be omitted. The results were very pleasing. While the other VK's with three element cubical quads, received a 20 dB over S9 report from Holland, we received 5X7 or 5X8 but readability was really 5, no repeating and a normal conversation.

CONSTRUCTION DETAILS

All joints overlap 30 cm and are secured with two zinc plated binding head self tappers 4G x 6mm. 30 mm from the end of the tubes all screws are in line on one side. Use a 2mm drill, heavy screw driver and a tapping action. Flatten top and remove corners.

Two 32 x 25 PVC reducing couplings make excellent insulators. Remove inside ridge and make a saw cut along the length. Clamp the tube in the insulator with a hose clip. A BB bolted clamp is suitable for the final mounting. All this material is available from your local plumbing supplier.

Just to be on the safe side, a 3mm hole was drilled in the top, a nylon washing line threaded through the centre and secured at the top and bottom as a safety line.

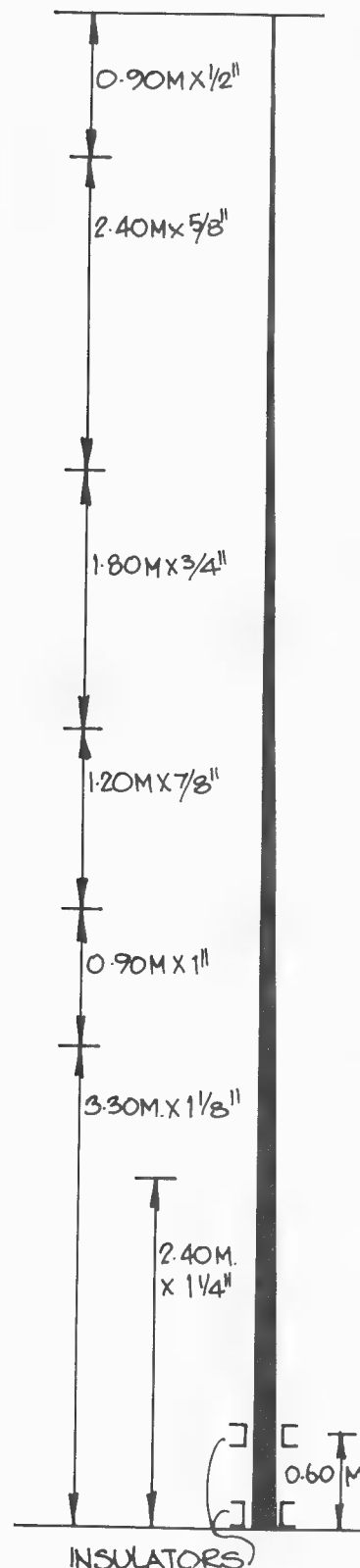


Fig. 2.

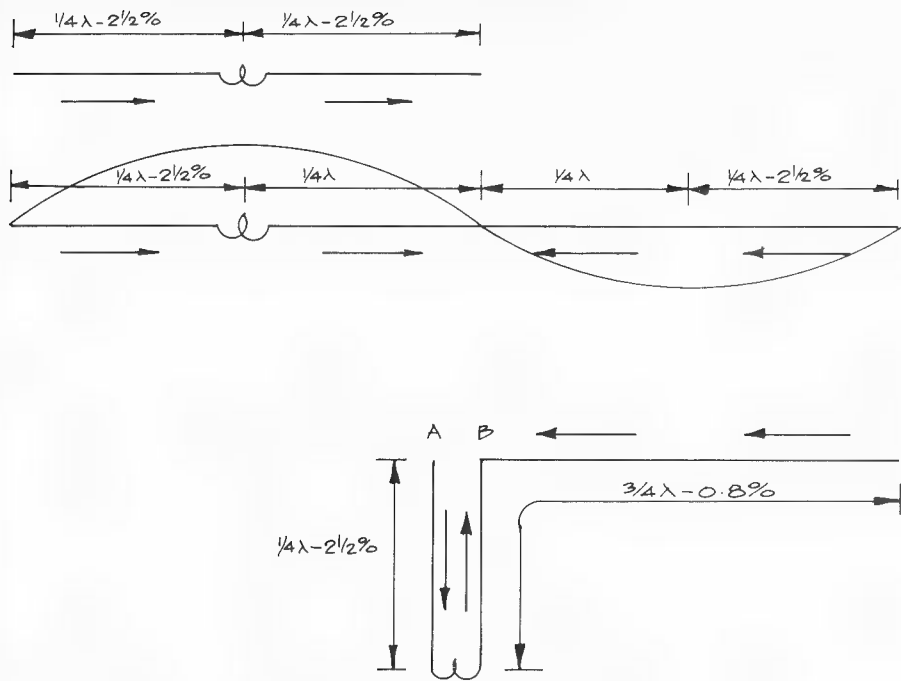


Fig 3: Evolution of the Zepp

All measurements for the 10 metre high, small diameter, light weight, free-standing vertical are in figure 2. The top section is shorter than the second section because the recovery to the straight-up position after a gust of wind was otherwise too slow.

TUNING THE EASY WAY

The first attempt using open feeders having half the length of the antenna, a 1:1 balun and two metres of coax connecting the balun to antenna tuner achieved quick results, free of problems. As a matter of fact all tuning afterwards did not improve communications.

TUNING THE HARD WAY

Operation without an antenna tuner is attractive. Low SWR can only be expected if the feed-point (balun) is exactly on the current loop of the whole system. This can be realised by trimming the dead end feeder A in figure 3. This is critical. Tuning to a specific frequency must be done at both feeders, at B three times the length as A. There are three quarters involved. The length of the vertical is not critical but the total, vertical + active-feeder is important. Figure 3 also indicates current direction to show the cancelling affect of the open feeders. Also shown in figure 3, the indicated 2.5% length reduction is a consequence of end-effect.

OPEN FEEDERS

Information on the construction of open feeders can be found in most handbooks and will depend on the material available. Here it was aluminium tubing and perspex spacers. Without a tuning capacitor the SWR is below 1.5 over the entire band.

NEW INFORMATION

Two items not found in text books might be of interest to other experimenters:

Firstly, tuning and matching of an antenna system can be done with an antenna tuner. With a 50 ohm dummy load one calibrates the tuner for 50 ohm in and out at the desired frequency. Note the tuning capacitor position replace load with antenna, and adjust the antenna until the same condition is achieved. The tuner can now be removed to eliminate its losses.

Secondly, with an antenna system accurately tuned and matched close to the high frequency end of the band, a capacitor parallel with the coax will do all the tuning needed.

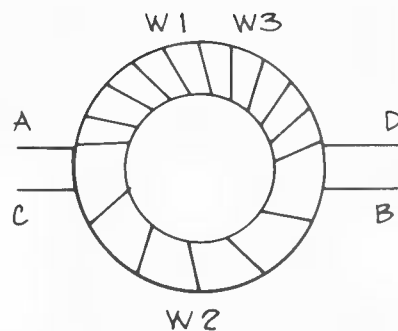
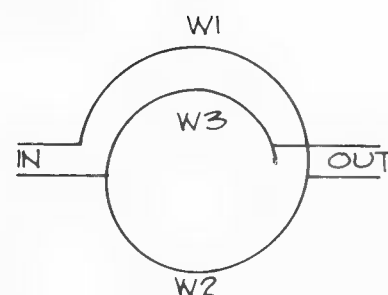
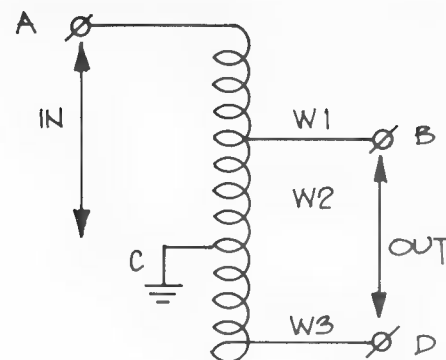
BALUN

If desired, a ferrite-core balun may be made. First wind 5 turns on one half of the core's circumference. Make a tap and then 5 turns on the other half. Make another tap. Continue winding another 5 turns in between the first set. See figure 4. This will give a 1 to 1 balanced to unbalanced transformation.

CONCLUSION

The half wave vertical is the simplest antenna to fulfil the writer's needs at the time. It survived all storms in 1981. Yes, even the one that ripped the roofs off houses and uprooted the trees in the streets.

This is not an antenna to win the GRANDSLAM MARATHON WORLD-WIDE DX CONTEST. Neither is it much use for calling in a pile-up. However, it will contact any station with a signal strength of S7 or more, and that is a lot of stations in a lot of countries.



WINDING 1, 2, 3, : 5 TURNS

Fig 4: Balun Winding



QSP

HOW MANY TRANSISTORS IN A COMPUTER?

Have you ever stopped to figure out how many transistors might be used in a home computer? Most home computers have 48K of storage. Now in computerese 48K means almost 50,000. This is bytes, and each byte is 4 bits, each of which is 2 transistors for a minimum of 8 transistors. This means that there are about 400,000 transistors for the memory alone. These memory bits are useless unless there is an input and an output circuit which may consist of 2 for each bit. This brings the number up to 800,000 transistors. Then there is the ROM, the circuits to control the disks, printers, serial devices, tape recorders, etc. This may well bring the total number of transistors up to one million on that 48K personal computer you have in the shack.

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